

FIG.1

PREDICTED vs ACTUAL COST COMPARISON  
OF  
TECHNOLOGY COST ESTIMATE WORKSHEET

TECHNOLOGY	NAME	PREDICTED	ACTUAL	% DELTA
CM4L 3LM	OMNI	\$872	\$833	4.7%
CM4LP 3LM	PHEONIX	\$805	\$856	-6.0%
CM5S 4LM	MUSTANG	\$1,188	\$1,121	6.0%
CM5S1 5LM	RACER	\$1,236	\$1,227	0.7%
CM5X 4LM	APACHE	\$1,191	\$1,152	3.4%
CM5X2 4LM	FURY	\$1,248	\$1,167	6.9%
CM6S 4LM	HURRICANE	\$1,322	\$1,340	-1.3%
CM6S2 4LM	TIGGER	\$1,407	\$1,299	8.3%
CM6S2 5LM	SC / 98	\$1,560	\$1,469	6.2%
CM6SF 4LM	PYTHON	\$1,531	\$1,437	6.5%
CM6SF 5LM	LONGTRAIL	\$1,816	\$1,691	7.4%
CM6X 4LM	TYPHOON	\$1,704	\$1,670	2.0%
CM7S 6LM	LONESTAR	\$2,464	\$2,607	-5.5%
CM7SF 3LM	COMMANDER	\$1,918	\$2,020	-5.0%
CM8S 4LM	BLIZZARD	\$2,238	\$2,240	-0.1%
SIGE6SF	COPERNICUS	\$2,809	\$2,726	3.0%
ICEC8S2 6LM	MAJESTIC*	\$3,214	\$3,325	-3.3%
ICEC9S 7LM	MAKO**	\$3,870	\$3,534	9.5%

\* Predictive Cost Estimated 12 Months Prior to Actual

\*\* Predictive Cost Estimated 18 Months Prior to Actual

FIG.2

TECHNOLOGY COST ESTIMATE WORKSHEET			
FOR THE FOLLOWING TECHNOLOGIES			
CM4S, CM4L, CM5L, CM5S, CM5S6, CM6X, CM5X2, CM6S, CM6S2, CM5SF, CM6X1, CM7S, CM7SF, CM8S, CS019S, CS019S2, CM9SF, CM8SF, ICEC7S, ICEC8S2, CS0110S			
TECHNOLOGY _____	<div style="width: 50px; height: 15px; background-color: #cccccc; border: 1px solid black;"></div>	← 301	
PHOTO GROUNDRULE _____	<div style="width: 50px; height: 15px; background-color: white; border: 1px solid black;"></div>	← 302	<u>300</u>
CURRENTLY IN PRODUCTION Y OR N _____	<div style="width: 50px; height: 15px; background-color: #cccccc; border: 1px solid black;"></div>	← 303	
IF "N" 10% CONTINGENCY ADDED			
FEOL BASE COST EXCLUDES: BR, KV, TAILORS, DUAL GATE AND OP LEVELS		FULL CAPACITY COST	MATURE FULL CAPACITY COST
FEOL BASE COST _____	<div style="width: 50px; height: 15px; background-color: white; border: 1px solid black;"></div>	← 313	<div style="width: 50px; height: 15px; background-color: white; border: 1px solid black;"></div> ← 314
FEOL OPTIONAL LEVELS:			<u>310</u>
311	Y or N	# OF MASK	312
BR RESISTOR	<div style="width: 20px; height: 15px; background-color: #cccccc;"></div>	<div style="width: 20px; height: 15px; background-color: white; border: 1px solid black;"></div>	<div style="width: 20px; height: 15px; background-color: white; border: 1px solid black; text-align: center;">0</div> ← 315
KV LEVEL	<div style="width: 20px; height: 15px; background-color: #cccccc;"></div>	<div style="width: 20px; height: 15px; background-color: white; border: 1px solid black;"></div>	<div style="width: 20px; height: 15px; background-color: white; border: 1px solid black; text-align: center;">0</div>
TAILOR VTS	<div style="width: 20px; height: 15px; background-color: #cccccc;"></div>	<div style="width: 20px; height: 15px; background-color: white; border: 1px solid black;"></div>	<div style="width: 20px; height: 15px; background-color: white; border: 1px solid black; text-align: center;">0</div>
DUAL GATE	<div style="width: 20px; height: 15px; background-color: #cccccc;"></div>	<div style="width: 20px; height: 15px; background-color: white; border: 1px solid black;"></div>	<div style="width: 20px; height: 15px; background-color: white; border: 1px solid black; text-align: center;">0</div>
OP RESISTOR	<div style="width: 20px; height: 15px; background-color: #cccccc;"></div>	<div style="width: 20px; height: 15px; background-color: white; border: 1px solid black;"></div>	<div style="width: 20px; height: 15px; background-color: white; border: 1px solid black; text-align: center;">0</div>
EDRAM OPTION: (DT,AE,AW,PP)	<div style="width: 20px; height: 15px; background-color: #cccccc;"></div>	<div style="width: 20px; height: 15px; background-color: white; border: 1px solid black;"></div>	<div style="width: 20px; height: 15px; background-color: white; border: 1px solid black; text-align: center;">0</div>
FEOL OPTIONAL COST _____	319	<div style="width: 50px; height: 15px; background-color: white; border: 1px solid black;"></div>	<div style="width: 50px; height: 15px; background-color: white; border: 1px solid black;"></div> ← 318
TOTAL FEOL COST WITH OPTIONS _____		<div style="width: 50px; height: 15px; background-color: white; border: 1px solid black;"></div>	<div style="width: 50px; height: 15px; background-color: white; border: 1px solid black;"></div>
BEOL BASE COST EXCLUDES: MC, MIM CAPACITOR, AND TD LEVELS BASED ON 4 THIN LEVELS OF METAL		FULL CAPACITY COST	MATURE FULL CAPACITY COST
BEOL BASE COST _____	<div style="width: 50px; height: 15px; background-color: white; border: 1px solid black;"></div>	← 321	<div style="width: 50px; height: 15px; background-color: white; border: 1px solid black;"></div> ← 322
BASE COST = 4 THIN LEVELS OF METAL			<u>370</u>
DELETE METAL LEVELS: For products with LESS than 4LM Indicate type of metal and # of levels			
323	Y or N	# OF LOM	324
Aluminum	<div style="width: 20px; height: 15px; background-color: #cccccc;"></div>	<div style="width: 20px; height: 15px; background-color: #cccccc;"></div>	<div style="width: 20px; height: 15px; background-color: white; border: 1px solid black; text-align: center;">0</div> ← 325
Thin Copper	<div style="width: 20px; height: 15px; background-color: #cccccc;"></div>	<div style="width: 20px; height: 15px; background-color: #cccccc;"></div>	<div style="width: 20px; height: 15px; background-color: white; border: 1px solid black; text-align: center;">0</div>
Thick Copper	<div style="width: 20px; height: 15px; background-color: #cccccc;"></div>	<div style="width: 20px; height: 15px; background-color: #cccccc;"></div>	<div style="width: 20px; height: 15px; background-color: white; border: 1px solid black; text-align: center;">0</div>
		→ 25/level for Cu → 60/level for Cu	<div style="width: 20px; height: 15px; background-color: white; border: 1px solid black; text-align: center;">0</div> ← 326

\*Shaded boxes need input

FIG.3A

ADD META LEVELS:

For products with MORE than 4LM

Indicate type of metal and # of levels

327 ☐ Y or N ☐ # OF LOM TO ADD 328

Aluminum ☐ 0  
Thin Copper ☐ 0  
Thick Copper ☐ 0

→ 25/level for Cu ☐ 0  
→ 60/level for Cu ☐ 0

BEOL BASE COST WITH LEVEL OF METAL ADJUSTMENTS → 331 ☐ 0

BASE COST ADDER FOR COPPER ☐ Y or N 333

334 ☐ 0 335 ☐ 0

ADDITIONAL BEOL LEVELS:

25/LEVEL ADDER FOR CU TECHNOLOGY

MC LEVEL ☐ Y or N 336  
MIM CAPACITOR ☐ 0  
TD LEVEL ☐ 0

337 ☐ 0 338 ☐ 0

ADDITIONAL BEOL LEVELS → 339 ☐ 0 342 ☐ 0

TOTAL BEOL COST WITH OPTIONS → 341 ☐ 0 340 ☐ 0

COST SUMMARY

390

	PLAN FULL CAPACITY COST		MATURE FULL CAPACITY COST	
BASE COST	<input type="checkbox"/> \$0	313	<input type="checkbox"/> \$0	314
OPTIONAL COST	<input type="checkbox"/> \$0	317	<input type="checkbox"/> \$0	318
RAW WAFER	<input type="checkbox"/> \$0	351	<input type="checkbox"/> \$0	352
SUPER COMMON	<input type="checkbox"/> \$0	353	<input type="checkbox"/> \$0	354
SUB TOTAL	<input type="checkbox"/> \$0	355	<input type="checkbox"/> \$0	356
CONTINGENCY OF 10% (NOT CURRENTLY IN PRODUCTION)	<input type="checkbox"/> \$0	357	<input type="checkbox"/> \$0	358
TOTAL PREDICTED COST	<input type="checkbox"/> \$0	359	<input type="checkbox"/> \$0	360

\*Shaded boxes need input

FIG.3B

FIG.3A

FIG.3B

FIG.3C

# EQUATIONS FOR TECHNOLOGY COST ESTIMATE WORKSHEET

FEATURE	FULL CAPACITY COST EQUATION	MATURE COST EQUATION	WHERE:	HOW DERIVED
FEOL BASE	$Y=272X^{-0.53}$	$Y=241X^{-0.493}$	$Y = \text{FEOL Base Cost}$ $X = \text{Groundrule}$	Least Squares Analysis
BEOL BASE	$Y=417X^{-0.486}$	$Y=388X^{-0.461}$	$Y = \text{BEOL Base Cost}$ $X = \text{Groundrule}$	Least Squares Analysis
BR RESISTOR	$Y=15.1X^{-0.362}$	$Y=13.5X^{-0.352}$	$Y = \text{BR Resistor Cost}$ $X = \text{Groundrule}$	Least Squares Analysis
KV LEVEL	$Y=15.5X^{-0.297}$	$Y=12.5X^{-0.489}$	$Y = \text{KV Level Cost}$ $X = \text{Groundrule}$	Least Squares Analysis
TAILOR VTS	$Y=49.8X^{-0.048}$	$Y=45.9X^{-0.0302}$	$Y = \text{Tailor VTs Cost}$ $X = \text{Groundrule}$	Least Squares Analysis
DUAL GATE	$Y=38.2X^{0.803}$	$Y=33.7X^{0.815}$	$Y = \text{Dual Gate Cost}$ $X = \text{Dual Gate Levels}$	Least Squares Analysis
OP RESISTOR	$Y=19.8X^{-0.512}$	$Y=17.9X^{-0.502}$	$Y = \text{OP Resistor Cost}$ $X = \text{Groundrule}$	Least Squares Analysis
MC LEVEL	$Y=58.8X^{-0.597}$	$Y=53.9X^{-0.584}$	$Y = \text{MC Level Cost}$ $X = \text{Groundrule}$	Least Squares Analysis
METAL LEVELS	$Y=111X^{-0.302}$	$Y=103X^{-0.282}$	$Y = \text{Metal Level Cost}$ $X = \text{Groundrule}$	Least Squares Analysis
MIM CAPACITOR	$Y=34.2X^{-0.523}$	$Y=30.8X^{-0.533}$	$Y = \text{MIM Cap Cost}$ $X = \text{Groundrule}$	Least Squares Analysis
TD LEVEL	85	77	NA	Direct Measurement
EDRAM	475	450	NA	Direct Measurement
CU ADDER	100	80	NA	Direct Measurement

FIG.4

FIG. 5

# TECHNOLOGY COST MODEL OVERVIEW

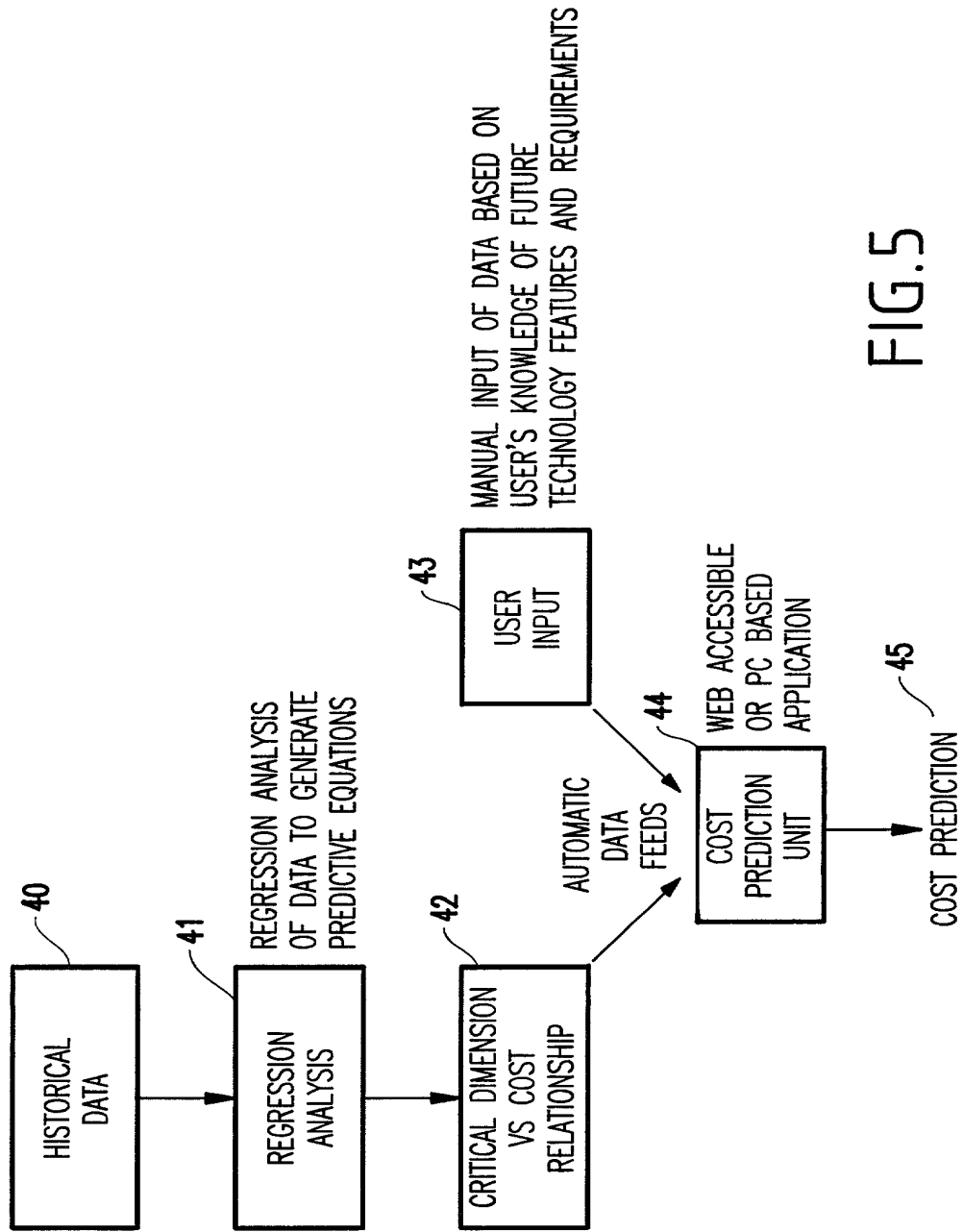


FIG. 5

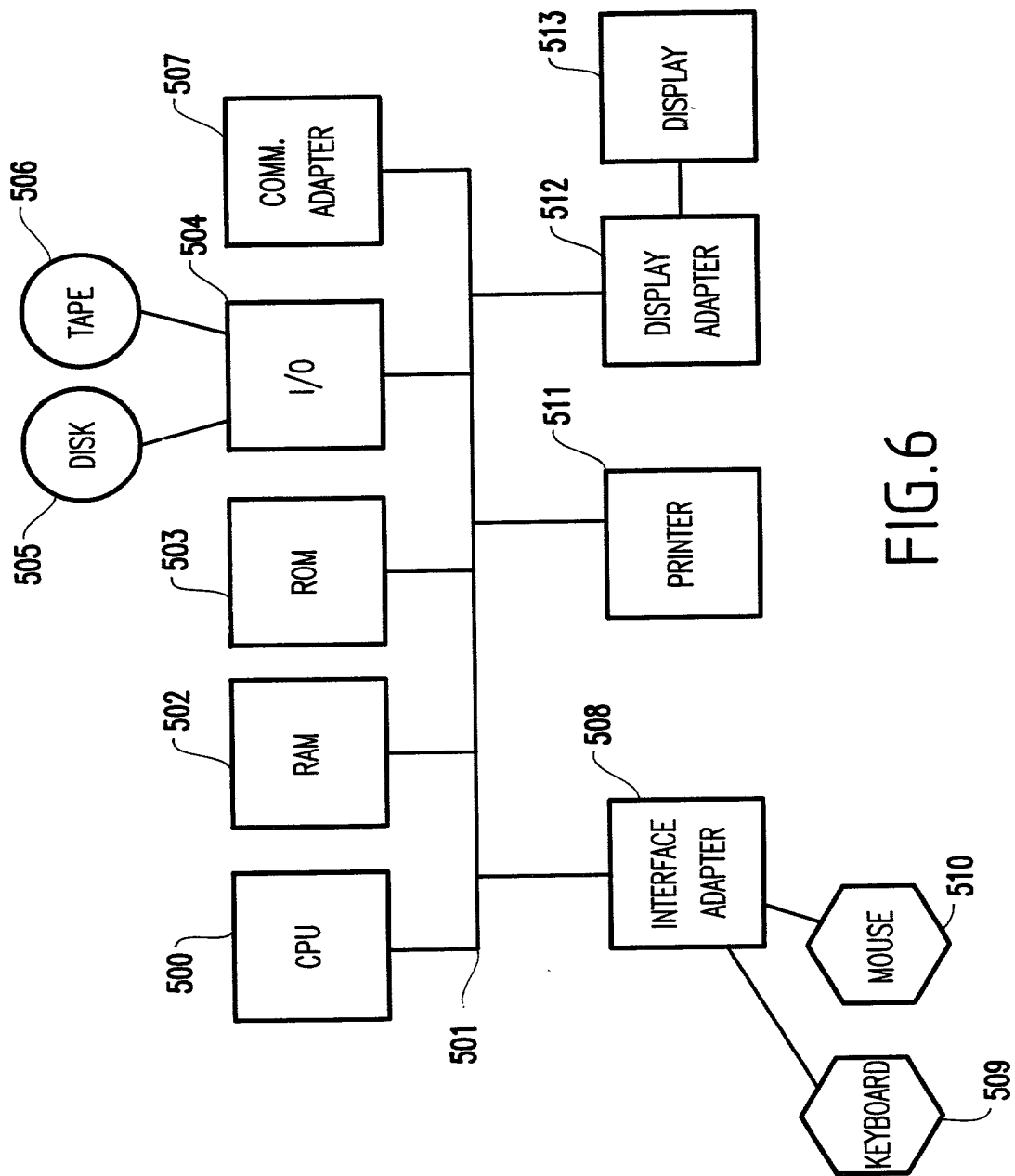


FIG. 6